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## Planting in Parks and Gardens as a Way of Protecting Rare Forest Species in Amur State, Far East Russia

### Озеленение как один из путей охраны редких представителей лесов Восточной Азии

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#### Abstract

The protection and utilization of biological resources including forests have become hot issues in the process of economic development and utilization of the Amur district as well as in the Far East Russia as a whole. Amur district lies on the border of two zones i.e. Boreal and East Asian Mountain, each of them represented by its specific flora. Current number of rare species in protected areas does not guarantee the preservation of the species. Therefore, we propose the conservation of endangered species in botanical gardens, parks, public and private gardens to notice the precious role of them to public people.

*Key words:* Far East Russia, endangered plant species, rare species, conservation, public places

#### Introduction

The Amur district occupies an area of 363,700 m<sup>2</sup>. It is situated in the Russian Far East in a climatic zone subjected to the far eastern monsoons. The larger part of the territory of Amur district, except its north-east part lying in the basin of the Lena River, lies in the basin of the Amur River and is part of East Asia. Namely, approximately half of Amur district consists of mountains and plains.

As a result of its geographical location, Amur district lies on the border of two zones (Boreal and East Asian area), each of them represented by its specific flora. Therefore, the flora of Amur district differs from that of other areas with its distinctive variety (Komarov 1953, Sochava 1969, Tachtadzyan 1978, Starchenko 2001). The main type of vegetation in Amur district is mixed conifer-broadleaf forests and larch forests (Starchenko 2001). Namely, in the Boreal region, forests consist of boreal junipers, small-leaved trees and mixed shrubs. In the Eastern Asian area, there are secondary small-leaved forests, broad-leaved forests and mixed conifer-broad-leaved forests. There is not a clear border between the two areas because boreal and secondary forests can spread over the borders of their zones.

The variety of forest species in a certain area depends on the kind of forest and flora of that area. Secondary forests possess the largest variety of trees: the most dominants among them are broad-leaved junipers and broad-leaved valley species. Unfortunately, those forests were recently damaged badly as a result of commercial developments of the area.

The flora of the Amur district - including adventive species - numbers is 1,953 kinds of vascular plants,

divided into 675 genera and 120 families (Starchenko, 2001). The dendroflora of Amur district includes 286 species belonging to 100 genus and 42 families. In the dendroflora of the different forests (boreal and secondary) exist 151 kinds of supreme or dominant species, among which are more than 100 dominant species of the dendroflora of the secondary forests.

The large portion of forest species is a result of the geography and relief of the area as well as the remaining large forests. It is necessary to note that dendroflora is dominated by secondary species, proof of the rich variety in species of the secondary forests which actually occupy a relatively small area. The adventive dendroflora comprises 29 species.

#### Conservation of forest species in the inhabited area

The protection and utilization of biological resources including forests have become hot issues in the process of economic development and utilization of the Amur district as well as in the Far East Russia as a whole. Two hundred and eighty one species have been listed in the Russia's Book of Endangered Species (Krasnaya kniga, 1988, Starchenko *et al.* 1995). The endangered dendroflora includes 35 species, 24 of which are forest plants, more or less characteristic of the Russian Eastern Asia's forests. A relatively large number of the endangered species (28 sp.) are found in natural reserves and other protected areas where guarantees their preservation a certain extent.

Long experience in the field shows that, unfortunately, the current number of rare species in protected areas does not guarantee the preservation of the species (for instance, *Dioscorea nipponika* Makino

is an example as shown in Fig.1). As some of those territories are often situated in the vicinity of different habitats or areas, they are subject to economic development and resource utilization. This leads to an increased danger of forest fires as well as to other impacts on the areas.

A tendency toward protecting rare species of forest plants by planting them in botanical gardens, parks, public and private gardens, began to develop in the end of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup> century. During the second half of the 20<sup>th</sup> century, this tendency

grew stronger and some of the particularly endangered dendroflora species were introduced as planting materials into cities and other inhabited areas. However, the best utilization of such species is observed in large inhabited areas.

The largest inhabited area in Amur district is the city of Blagoveshchensk, located upon the junction of two large rivers: the Zei and the Amur (Fig. 2). Although the city and its surroundings lie in the zone of secondary vegetation, boreal vegetation has influenced the characteristics of the area's vegetation.



Fig. 1. *Dioscorea nipponika* Makino.



Fig. 3. *Princepia chinensis* (Oliv.) Oliv. ex. Bean

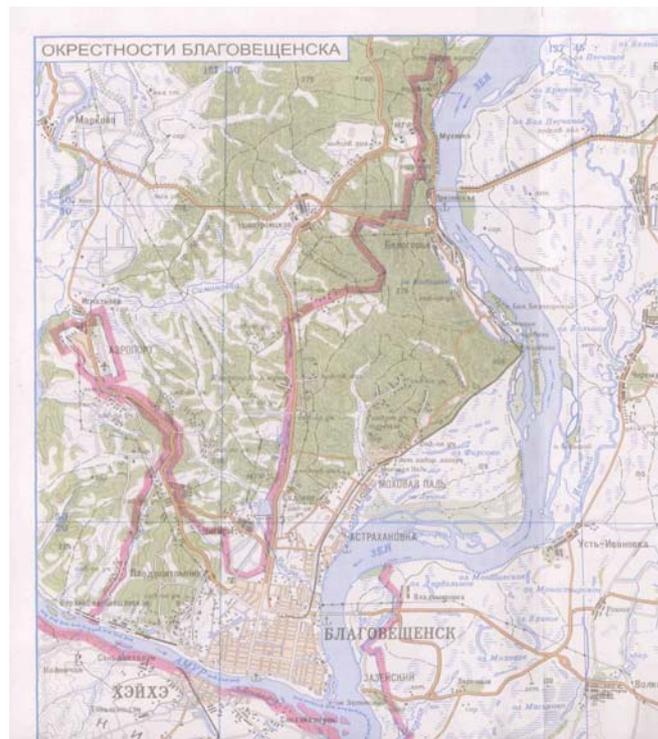


Fig. 2. A map of Blagoveshchensk, Amur and near its vicinity.

### Study sites and Methods

An inspection of the city of Blagoveshchensk and its surrounding areas showed that there were 150 dendroflora species, more than 100 of which are typical species for the forests of Eastern Asia. A comparison of the latest data to that of previous research shows that the dendroflora of the city and its surrounding areas has changed significantly over the years (Maksimovich 1859, 1862, Korzhinskii 1892, Starchenko 2001, 2005, Iliyina and Starchenko 2000, Starchenko and Darman, 2002). At present, the dendroflora of Blagoveshchensk consists of surviving representatives of the local aborigine flora, original dendroflora species of the Amur district and adventive elements. While the existence of the former two is a result of planned or accidental planting, the latter (i.e. adventive elements) consists of constantly disappearing and reappearing species (14 sp.) and naturalized species (13 sp.) (Starchenko 2001, 2005, Iliyina and Starchenko 2000, Starchenko and Darman 2002)

### Results and discussion

Literature survey of the plant variety of the dendroflora of Blagoveshchensk and its surroundings shows 20 species listed in the Book of Endangered Species (Table 1). Thirteen of them are found in comparatively less damaged areas of the natural habitat (Starchenko 2001, 2005, Iliyina and Starchenko 2000, Starchenko and Darman 2002) around the city of Blagoveshchensk. Six species in Blagoveshchensk could be found only in artificially created habitat and personal properties.

We should note the appearance of *Princepia chinensis* (Oliv.) Oliv. ex Bean (Fig. 3), which has been listed in the Krasnaya kniga Rossii (1988) and which has been brought into the district of Blagoveshchensk from China in the recent years.

The observed dendroflora of Blagoveshchensk and its vicinity were carried out in public gardens, squares and streets in the center of the city. The place for field observation was made in the following major parks and public gardens in Blagoveshchensk and its vicinity. The number in parenthesis means observation places: Pervomaiskii Park (1), Square Pobedy (2), the Garden of the Palace of the Labor unions (39), the public garden on 50 Let Oktyabrya Streets (4), and the Lenin square (5). The variety of dendroflora species in the private sites in the city and its surroundings were investigated and are shown in Table 1.

The data in Table 1 show that a significant number of the aborigine dendroflora (i.e. 48 to 56 species depending on the observed area) was found in the gardens of the city. The whole number of dendroflora species used for garden- and park-planting depends on the size of the observed plots, their surroundings and the level of damage. Secondary species in Eastern-Asian Russia constituted the major part of the dendroflora of the city. Decorative species of the local aborigine flora which are the most often used for planting in parks and gardens were considered as the part of the vegetation variety of the secondary forests along the riversides of the Zei river and the Amur river.

These species were as follows: *Fraxinus mandshurica*, *Juglans mandshurica*, *Maackia amurensis*, *Phellodendron amurense*, *Pyrus ussuriensis*, *Ribes diacantha*. All of them were found in the observed parks and gardens where we studied (see Table 1). The first 5 species have been planted for more than 30 years ago, and so have proved to be a resilient under urban conditions. They reached the age and size for flowering and bearing fruits frequently.

Quite recently, in the end of 20<sup>th</sup> century, *Ribes diacantha* appeared as a planting material for an ornamental plant and can be seen in many parts of the city at present (Table 1 and 2). Many of the rare and protected dendroflora species are widely used in the private sector, especially decorative and foodstuff plants such as: *Actinidia kolomikta*, *Philadelphus tenuifolius*, *Pinus koraiensis*, *Princepia chinensis* (Fig. 3.), *Pyrus ussuriensis*, *Rhododendron dauricum*, *Schisandra chinensis*, *Vitis amurensis*, etc.

The studied dendroflora of Blagoveshchensk and its surroundings indicated that the method of introduction of rare species to park- and garden-planting is considered to be a practical way of preserving endangered representative species native to the flora of Far East Russia in nature.

Table 1. Woody plants of Blagoveshchensk and its vicinity

<i>Actinidia kolomikta</i> (Maxim.) Maxim. <sup>1)</sup>
<i>Aralia elata</i> (Miq.) Seem.
<i>Atragene macropetala</i> (Ledeb.) Ledeb.
<i>Deutzia parviflora</i> Bunge
<i>Dioscorea nipponica</i> Makino <sup>2)</sup>
<i>Eleutherococcus senticosus</i> (Rupr. et Maxim.) Maxim.
<i>Fraxinus mandshurica</i> Rupr.
<i>Juglans mandshurica</i> Maxim.
<i>Maackia amurensis</i> Maxim. et Rupr.
<i>Phellodendron amurense</i> Rupr.
<i>Philadelphus tenuifolius</i> Rupr. et Maxim.
<i>Pinus koraiensis</i> Siebold et Zucc.
<i>Princepia chinensis</i> (Oliv.) Oliv. ex Bean
<i>Pyrus ussuriensis</i> Maxim.
<i>Rhododendron dauricum</i> L.
<i>Ribes diacantha</i> Pall.
<i>Salix integra</i> Thunb.
<i>Schisandra chinensis</i> (Turcz.) Baill.
<i>Solanum kitagawae</i> Schonbeck-Temesy
<i>Vitis amurensis</i> Rupr.

<sup>1)</sup> Dendroflora species appeared at the territory of Blagoveshchensk from other areas of Amur region and Far East of Russia (typed italic).

<sup>2)</sup> Species recorded in The Red Book of Russia (1988) typed bold.

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Table 2. Dendroflora of observed plots in the city of Blagoveshchensk and its surroundings.

+ means dominant species in the location of study site.

Location	1	2	3	4	5	6	7
Number species of common/ invasive/ endangered	56/4/7	21/3/1	31/9/3	36/5/5	34/7/4	36/7/5	96/23/15
<i>Actinidia kolomikta</i>							+
<i>Aralia elata</i>							+
<b><i>Dioscorea nipponica</i></b>							+
<i>Eleutherococcus senticosus</i>							+
<i>Fraxinus mandshurica</i>	+	+	+	+	+	+	+
<i>Juglans mandshurica</i>	+		+	+		+	+
<i>Maackia amurensis</i>	+			+	+	+	+
<i>Phellodendron amurense</i>	+		+	+	+	+	+
<i>Philadelphus tenuifolius</i>						+	+
<i>Pinus koraiensis</i>							+
<b><i>Princepia chinensis</i></b>							+
<i>Pyrus ussuriensis</i>	+		+		+		+
<i>Rhododendron dauricum</i>							+
<i>Ribes diacantha</i>			+	+		+	+
<i>Schisandra chinensis</i>	+						+
<i>Solanum kitagawae</i>	+						
<i>Vitis amurensis</i>	+						+